



# 12v lead acid battery charging

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Dependable performance and long service life of your sealed lead acid battery will depend upon correct battery charging. Following incorrect charging procedures or using inadequate charging equipment can result in decreased battery life and/or poor battery performance. The selection of a suitable SLA battery charger and the methods used to charge it is just as important as choosing the right battery for the application.

Power Sonic recommends you select a charger designed for the chemistry of your battery. This means we recommend using a sealed lead acid battery charger, like the the A-C series of SLA chargers from Power Sonic, when charging a sealed lead acid battery.

To charge a sealed lead acid battery, a DC voltage between 2.30 volts per cell (float) and 2.45 volts per cell (fast) is applied to the terminals of the battery. Depending on the state of charge (SoC), the cell may temporarily be lower after discharge than the applied voltage. After some time, however, it should level off.

During charge, the lead sulfate of the positive plate becomes lead dioxide. As the battery reaches full charge, the positive plate begins generating dioxide causing a sudden rise in voltage due to decreasing internal resistance. A constant voltage charge, therefore, allows detection of this voltage increase and thus control of the current charge amount.

During constant voltage or taper charging, the battery's current acceptance decreases as voltage and state of charge increase. The battery is fully charged once the current stabilizes at a low level for a few hours. There are two criteria for determining when a battery is fully charged: (1) the final current level and (2) the peak charging voltage while this current flows.

Selecting the appropriate charging method for your sealed lead acid battery depends on the intended use (cyclic or float service), economic considerations, recharge time, anticipated frequency and depth of discharge (DoD), and expected service life. The goal of any charging method is to control the charge current at the end of the charge.

Constant voltage charging is the best method to charge sealed lead acid batteries. Depending on the application, batteries may be charged either on a continuous or non-continuous basis. In applications where standby power is required to operate, for example a security system or uninterruptible power supply (UPS), when the AC power has been interrupted, continuous float charging is recommended. Non-continuous cyclic charging is used primarily with portable equipment where charging on an intermittent basis is appropriate, such as electric wheelchairs and mobile medical carts.

The constant voltage charge method applies a constant voltage to the battery and limits the initial charge current. It is necessary to set the charge voltage according to specified charge and temperature characteristics.

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Inaccurate voltage settings can cause either over-charge or under-charge. This charging method can be used for both cyclic and standby applications.

Constant current charging is suited for applications where discharged ampere-hours of the preceding discharge cycle are known. Charge time and charge quantity can easily be calculated, however an expensive circuit is necessary to obtain a highly accurate constant current. Monitoring of charge voltage or limiting of charge time is necessary to avoid excessive overcharge of the battery.

While this charging method is very effective for recovering the capacity of a SLA battery that has been stored for an extended period of time, or for occasional overcharging to equalize cell capacities, it lacks specific properties required in today's electronic environment.

The taper current charging method is not recommended as it is somewhat abusive of sealed lead acid batteries and can shorten service life. However, because of the simplicity of the circuit and low cost, taper current charging is extensively used to charge multiple numbers and/or for cyclic charging.

In a taper current charging circuit, the current decreases in proportion to the voltage rise. When designing a taper charger always consider power voltage fluctuations. In this event the internal resistance drop will convert to heat. Heat generated by the circuit should be measured and if required a heat sink should be incorporated in the design.

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